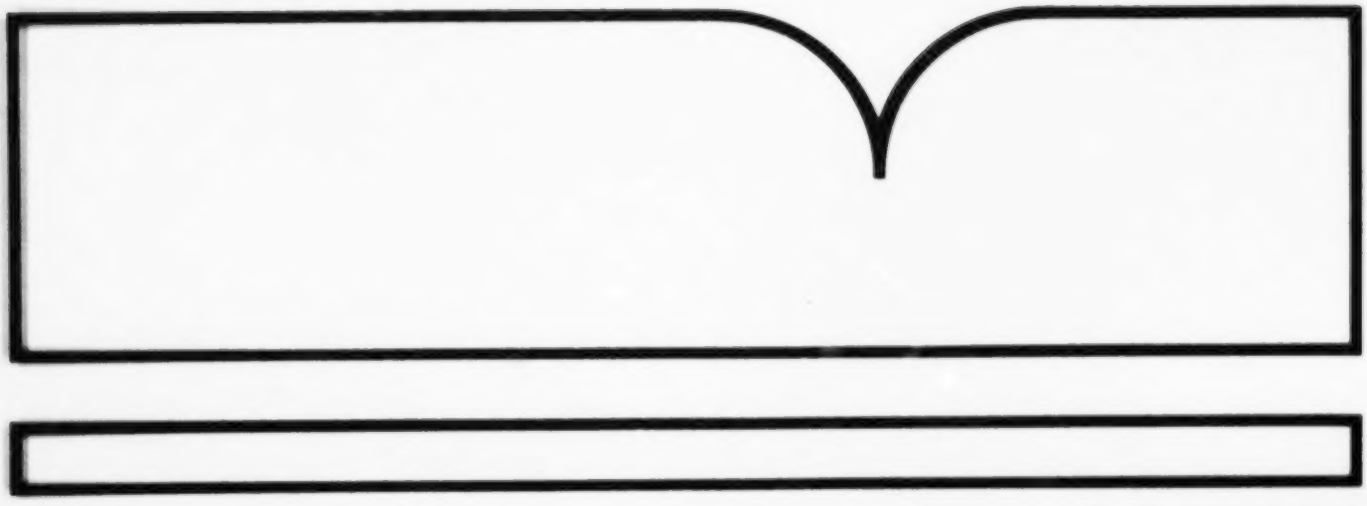
PB87-188868

Superfund Record of Decision (EPA Region 5)
Arcanum Iron and Metal, Twin Township
Darke County, Ohio, September 1986

(U.S.) Environmental Protection Agency
Washington DC

26 Sep 86



U.S. Department of Commerce
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United States
Environmental Protection
Agency

Office of
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Remedial Response

EPA/ROD/R05-86/036
September 1986

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EPA

Superfund Record of Decision:

Arcanum Iron and Metal, OH

REPRODUCED BY
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16. ABSTRACT

The Arcanum Iron and Metal (AIM) site is a 4.5 acre site located in Twin Township, Darke County, OH just southeast of the city of Arcanum and 25 miles northwest of Dayton. The AIM site operated as a lead battery reprocessing facility from the early 1960s until 1982. During this operation, battery casings were split to extract lead cores for smelting. Battery acids generated from this operation were dumped in a large steel trough and allowed to drain to a low area. Reprocessing of the plastic and black rubber battery casings generated lead oxide sludge and lead particulates which collected on the ground surface and surface ponds onsite. Past practices at the facility included burial of some materials in onsite pits. Results of the surface soil and soil boring samples taken during the RI indicate that lead is the primary contaminant of concern with antimony and arsenic leading the contaminants of secondary concern. Lead was detected in onsite and offsite monitoring wells but not in the six offsite residential wells sampled. Lead contamination was also found in onsite and offsite surface water and sediments and three onsite buildings. In addition, an estimated 3,800 cubic yards of shredded battery casings exist onsite.

The cost effective remedy selected includes: removal of onsite contaminated soils to 500 ppm lead and disposal in offsite RCRA Subtitle C landfill; removal of offsite soils to background lead concentrations and disposal of soils above 500 ppm in offsite RCRA (See Attached Sheet)

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Arcanum Iron and Metal, OH Contaminated Media: gw, sw, soil, sediment Key contaminants: lead, antimony, arsenic, heavy metals		

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SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

ARCANUM IRON AND METAL SITE

SITE LOCATION AND DESCRIPTION

The Arcanum Iron and Metal Site (AIM) is located in Twin Township, Darke County, Ohio just southeast of the city of Arcanum and 25 miles northwest of Dayton, Ohio (Figure 1). It is bordered on the north by Pop Rite Lane, on the east by the Baltimore and Ohio Railroad tracks and an agricultural field, and on the west and south by agricultural fields. The site covers about 4.5 acres. The surrounding topography is nearly level; however, the site is within a watershed area that includes about 15 acres immediately west of the site. Surface runoff is channeled to Sycamore Ditch (Figure 2).

The AIM site is in a rural, agricultural area. The nearest population center is the city of Arcanum with 1,943 residents. The residential population within a 3 mile radius of the site was approximately 3,360 in 1980.

One aquifer, having both an upper and lower zone, was identified at the site. The upper zone does not feed wells used for domestic or municipal water supplies in the immediate area of the site. Surface waters from the site enter Sycamore Ditch via a storm sewer that discharges upstream of the Arcanum Waste Water Treatment Plant lagoons. The water in Sycamore Ditch empties into Painter Creek.

Pertinent features of the site include the following: the former saw building, the former office building, chain-link fence, battery case pile, a pile of contaminated soil from an emergency removal action, and an abandoned storm sewer. Battery casings are also stored in the saw building. Pertinent features adjacent to the site include a storm sewer, croplands, a farm house, and the former Pop Rite Plant.

SITE HISTORY

The AIM site operated as a lead battery reprocessing facility from the early 1960's until 1982. The AIM facility accepted automobile and industrial batteries for reprocessing. During this operation, battery casings were

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DECLARATIONS

Consistent with the Comprehensive Environmental Response Compensation, and Liability Act of 1980 (CERCLA), and the National Contingency Plan (40 CFR Part 300), I have determined that the remedy outlined above at the Arcanum Iron and Metal Site is a cost-effective remedy and provides adequate protection of public health, welfare, and the environment. The State of Ohio has been consulted and agrees with the approved remedy. In addition, the action will require future operation and maintenance activities to ensure the continued effectiveness of the remedy. These activities will be considered part of the approved action and eligible for Trust Fund monies for a period of one year.

I have also determined that the action being taken is appropriate when balanced against the availability of Trust Fund monies for use at other sites. In addition, the off-site secure disposition is more cost-effective than other remedial action, and is necessary to protect public health, welfare or the environment.

Sept. 26, 1986
Date

Valdas V. Adamkus
Regional Administrator

RECORD OF DECISION

REMEDIAL ALTERNATIVE SELECTION

SITE: Arcanum Iron and Metal Site

DOCUMENTS REVIEWED

I am basing my decision primarily on the following documents describing the analysis of cost-effectiveness of remedial alternatives for the AIM site:

- Final Remedial Investigation Report, Arcanum Iron and Metal Site, August 9, 1985.
- Public Comment Feasibility Study, Arcanum Iron and Metal Site, July 15, 1986
- Summary of Remedial Alternative Selection, Arcanum Iron and Metal Site, August, 1986.
- Arcanum Iron and Metal Site Responsiveness Summary, September, 1986.

DESCRIPTION OF SELECTED REMEDY

° Remove onsite contaminated soils to 500 ppm lead. Dispose of soils offsite in RCRA Subtitle C landfill.

° Remove offsite soils to background lead concentrations. Dispose of soils above 500 ppm in RCRA Subtitle C landfill. Soils between background and 500 ppm placed onsite.

° Continue monitoring the groundwater semi-annually.

° Improve site drainage.

° Remove remaining battery casings and place in a RCRA Subtitle C landfill.

° Demolish or clean contaminated facilities onsite.

° Deed restrictions on the site land use and aquifer use in the affected areas.

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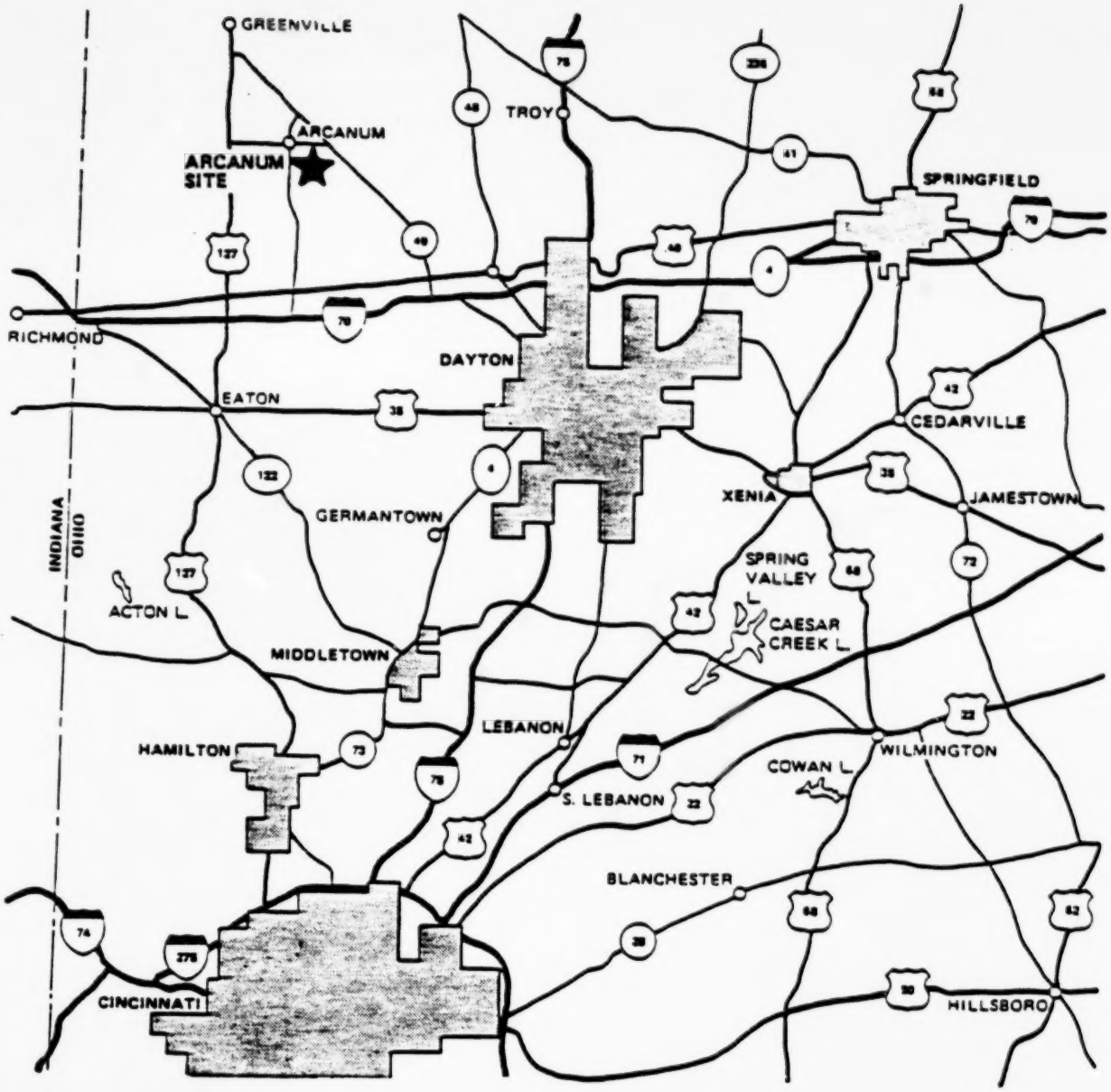


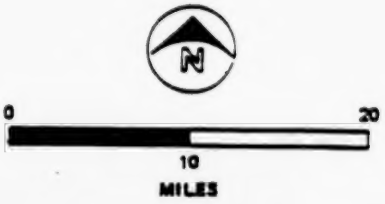
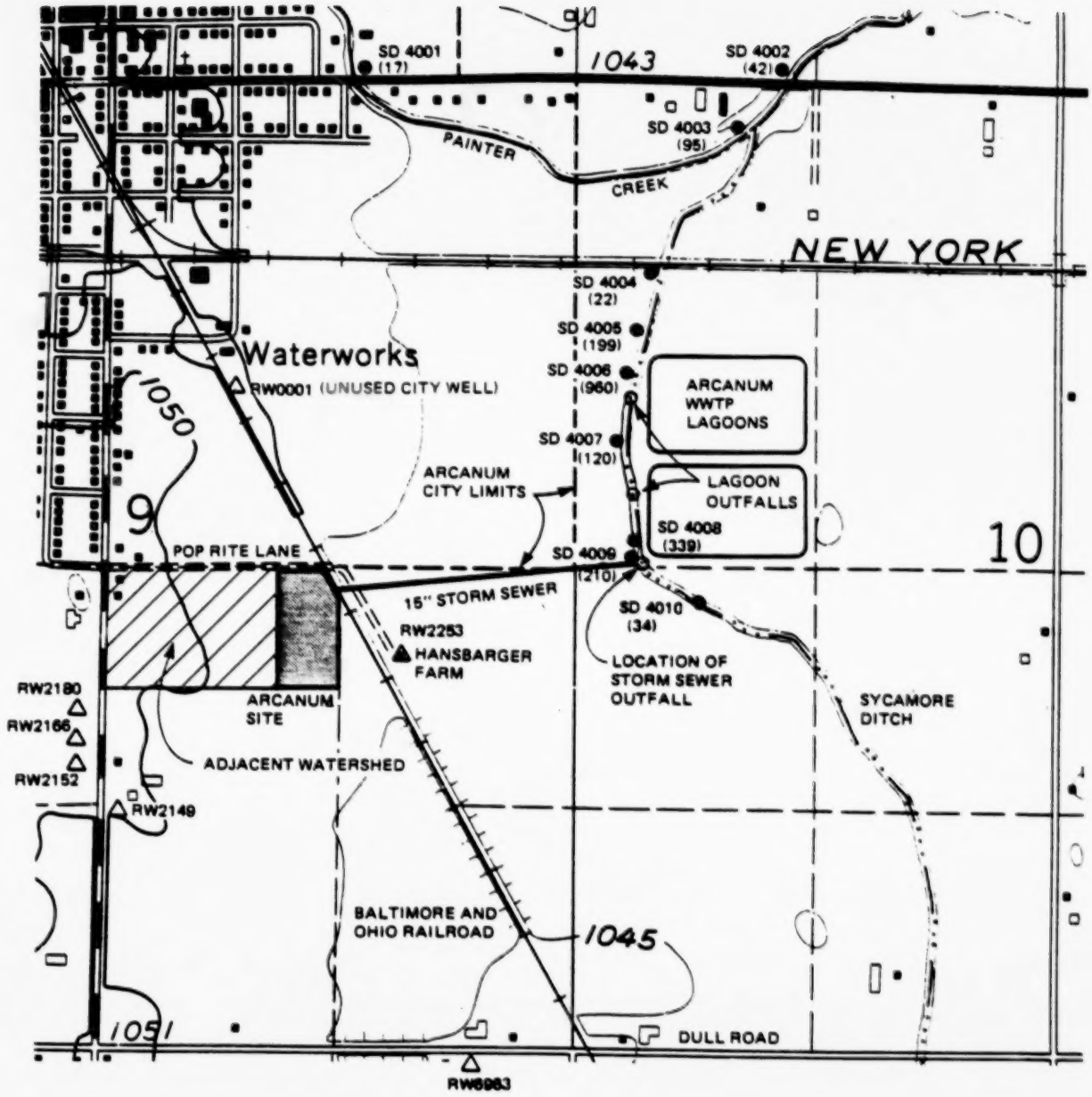


FIGURE 1
VICINITY MAP
ARCANUM IRON AND METAL SITE FS



LEGEND

- ● APPROXIMATE SEDIMENT SAMPLE LOCATION
- SD 4001 SAMPLE LOCATION IDENTIFICATION
- (34) LEAD CONCENTRATION (mg/kg)
- △ RW0001 RESIDENTIAL WELL SAMPLING LOCATION
- ⊙ OUTFALL STRUCTURE

N

0 1600

800

SCALE IN FEET

FIGURE 2
RI SEDIMENT AND RESIDENTIAL WELL SAMPLING LOCATIONS
ARCANUM IRON AND METAL SITE FS

split to extract lead cores for smelting. This operation generated plastic and black rubber casings and battery acids. After the casings were split, the sulfuric acid was dumped into a large steel trough in the middle of the saw building and allowed to drain outside to a low area in the ground surface. The lead cores were extracted from the casings for smelting. The lead smelter facility may have emitted lead-containing particulates during operation.

The plastic battery casings were stockpiled and then reprocessed. During reprocessing, lead oxide sludge was generated and then piled for recycling behind the saw building. During dry weather, the lead oxide sludge became a dust hazard and was controlled by wetting down with water. This generated water contaminated with suspended lead oxide particulates and soluble lead salt that flowed out of the back of the saw building through a small pipe and collected in pools on the ground surface. The plastic battery casing stockpile also generated runoff contaminated with lead oxide which tended to pond around the stockpile during rainstorms. The black rubber casings were ground into chunks and stockpiled onsite. These rubber chips contained concentrations of lead. During rainstorms, lead particles were washed off into surface ponds onsite. Past practices at the Arcanum facility included burial of some materials in onsite pits.

The earliest Ohio EPA file reference regarding the Arcanum site is 1964 when a fish kill was reported in Painter Creek caused by contamination conveyed via Sycamore Ditch. The Ohio Department of Health requested the owner to initiate a program for collecting, neutralizing, and disposing of battery acid. In October 1973, the Ohio EPA's Division of Waste Management and Engineering made the first of many site visits to investigate AIM's operation. In January 1974, the Ohio EPA requested that the owner of the AIM site apply for a Permit to Install an acid treatment system. Ohio EPA spent the next 2 years trying to get AIM to install the treatment system and adhere to the conditions and restrictions of the permit.

In June 1979, Ohio EPA requested enforcement proceedings and litigation by the Ohio Attorney General. In October 1979, a Consent Decree was signed by the site owner to clean up the site. However, cleanup efforts were not satisfactorily completed. Subsquently, AIM was found to be in contempt of court in April 1980.

Since April 1980, the Ohio EPA and the Ohio Attorney General's office have continued to pursue legal actions for the cleanup of the AIM site. In September 1980, a Citation and Notification of Penalty was issued to AIM for failure to install a treatment system. The Ohio EPA requested in April 1982 that legal action be taken to close the AIM facility. No legal action was taken because the owner ceased operation in December 1982, and removed the processing equipment in January 1983.

In September 1982, the Ohio EPA proposed the site for inclusion on the U.S. EPA's National Priorities List (NPL) and submitted a Hazard Ranking System score of 62 to the U.S. EPA. The score was high enough to include the site on the NPL in December 1982.

In January and February of 1986 approximately 300 cubic yards of lead contaminated soils from a site in downtown Arcanum were placed on the AIM site during an emergency removal action conducted by the owner of the AIM site. The owner of the AIM site had operated the downtown site as a battery recycling facility prior to startup of the AIM facility.

CURRENT SITE STATUS - Summary of RI Data

During 1984, the U.S. EPA conducted a Remedial Investigation at the AIM site to determine the nature and extent of contamination at and near the site. The tasks and data are reported in the Remedial Investigation Report dated August 1985.

Soils

Surface soil and soil boring samples taken at the Arcanum site show that lead is the primary contaminant of concern with antimony and arsenic leading the contaminants of secondary concern. Both lead and antimony are components of automobile batteries and therefore can be attributable to site activities. Quantities of lead in soil, both on and offsite, appear in orders of magnitude greater than background levels. Lead contamination ranged onsite from 1,520 mg/kg to 58,600 mg/kg and was greatest near the former processing areas. The vertical extent of contamination in the former process areas was estimated to be 9' and the maximum volume of onsite contaminated soils was estimated at 39,500 cu yds. The lateral extent of surface soil contamination offsite is estimated to extend 250 feet east of the site based on a limited number of data points. The offsite contamination is believed to be the result of airborne lead from the site's former smelter.

The U.S. Public Health Service, Centers for Disease Control, has stated that lead concentrations in soil greater than the range of 500-1000 mg/kg threaten the health of children in residential settings. There are locations within the site which have lead concentrations that could cause daily chemical intake (DCI) values to exceed the Acceptable Daily Intake (ADI) levels when the ADI is based on the Primary Drinking Water Standard for lead, 50 ug/l, with

an ingestion rate of 2 liters/day. Lead DCI levels exceeded ADI levels for all onsite surface and subsurface soils and two nonbackground offsite surface soils. The site is currently zoned industrial in a sparsely populated, rural setting. Site access is limited by a surrounding fence; therefore, presently public exposure due to direct contact with lead in soils is unlikely.

Because of the high clay content of the site's soil, leaching of lead to the groundwater is considered a difficult path of contaminant migration. Inhalation of dust particles contaminated with lead may increase health risks since lead is known to cause toxic effects by inhalation.

The background concentration of antimony was estimated to be less than 15 mg/kg based on surface soil and soil boring samples expected to be uncontaminated by site activities. Most surface soil samples onsite and some nearby offsite areas showed concentrations above the assumed background concentration. Surface soils near the saw building also showed elevated concentrations of antimony (127 mg/kg and 167 mg/kg). The maximum concentration for antimony was 2,550 mg/kg found near the former smelter. Arsenic was detected in all surface soil samples except two. In the onsite surface soil samples, the arsenic concentration ranged from non-detectable to 58 mg/kg. In the onsite subsurface samples, arsenic was detected at levels higher than the off-site subsurface soil samples (9.2-36 mg/kg, onsite ND offsite). Cancer risk levels were calculated for arsenic because it has an ingestion cancer potency. The risk levels were calculated using a conservative scenario involving potential future exposure of people to surface soils or excavated subsoils in a residential setting and an industrial setting. The excess lifetime cancer risk associated with both maximum and average arsenic concentrations are presented for surface soils. Only maximum arsenic concentrations were used in the subsurface soils. Those results are summarized in Table 1.

Groundwater

Based on the Endangerment Assessment in the RI report, lead is the only site related groundwater contaminant of concern. All the onsite monitoring wells had lead contamination and the concentration range was 23 to 176 ug/l. Background samples measured 5 and 12 ug/l. The primary drinking water standard for lead (50 ug/l) was exceeded onsite and the DCI exceeded the ADI in all the onsite wells. Deep and shallow wells appear to be equally contaminated. Lead contamination has not been found above the primary drinking water standard in offsite monitoring wells. Also, lead was not detected in the six offsite residential wells in the immediate vicinity of the site.

TABLE 1

SUMMARY OF EXCESS CANCER RISK[1] FROM INGESTION OF SOIL
SOIL OPERABLE UNIT

Subunit	Location	Arsenic Concentration (mg/kg)	Excess Cancer Risk[2] Residential[3]	Worker[4]
On-Site Surface Soils	Samples 1005-1007	16[5]	3E-3	6E-5
		11.6[6]	2E-3	4E-5
	All others	58[5]	1E-2	2E-4
		23[6]	4E-3	8E-5
Subsoils	On-site	36[7]	7E-3	1E-4
	Off-site	-	-	-
Off-site Surface Soil	Background (2001)	-[7]	-	-
	Samples 3006 & 3007	48[5]	9E-3	2E-4
		47[6]	9E-3	2E-4
	All Remaining Samples	11[5]	2E-3	4E-5
		2.7[6]	5E-4	1E-5

NOTES

1. Potential risk only, currently no one is facing the calculated excess risk.
2. Based on ingestion of soil containing arsenic - (arsenic cancer potency = 15 (mg/kg-day)). (5)
3. Calculated using a LASI x f = 0.028 x 0.45 = 0.0126 mg/kg-day.
4. Calculated using a LASI x f = 0.000246 mg/kg day.
5. Maximum concentration found in subunit.
6. Average concentration found in subunit.
7. Arsenic not quantified in these samples.

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Surface Water and Sediments

The AIM site watershed area, shown in Figure 2, includes 4.5-acre AIM site, which is primarily covered by grass and weeds, and 14.9 acres immediately west of the AIM site, which is cultivated and currently planted. The watershed area gently slopes to the east and produces surface runoff that drains across the AIM site where it is intercepted by a 15-inch corrugated steel pipe storm sewer located approximately 250 feet south of the AIM site's northeast property corner. The storm sewer carries the potentially contaminated runoff approximately 1,700 feet east where it drains into Sycamore Ditch and subsequently flows into Painter Creek. This storm sewer may extend to the west under the site.

The RI hydrologic study determined that the capacity of the existing 15-inch storm sewer is too small to properly drain all of the surface runoff produced during heavy rainfalls, causing potential flooding of both offsite and onsite property. The worst potential for flooding occurs during a 1-hour rainfall. Three onsite topographic depressions, identified in the RI, tend to collect and trap approximately 4,700 ft^3 of the surface water.

The potential exposure of humans to contaminated surface water could occur through dermal absorption or ingestion. Due to the fact that site access is limited, potential exposure of humans to contamination from the site that is carried to Sycamore Ditch and beyond to Painter Creek is more likely to occur.

RI data indicate that lead is the contaminant of concern in the samples taken from Sycamore ditch. The likely contribution from the site extends 1200 feet from the storm sewer outfall. Analytical results showed a 4 to 30 fold increase over the upstream lead sample. The highest sediment concentration before the Waste Water Treatment Plant's lagoon outfalls is 339 ppm. Lead DCIs exceeded the ADI for lead in mid-stream sediment samples, assuming the sediments were dried and exposed for ingestion. Affected receptors would include aquatic life in Sycamore ditch and possible human exposure during low to dry creek levels.

Facilities

There are three structures onsite, two were process related and one was an office building. One of the former process buildings, the saw building, is full of battery casings inside. It is likely that the walls of

the building are contaminated. The other process building, the former smelter building, is just a small open shed located near the southern boundary of the site. The office building is abandoned. Since it did not house process equipment, it is unlikely that it is contaminated.

The onsite storm sewer, if it exists, should be located, excavated and removed to eliminate it as a possible conduit for offsite contaminant migration.

Battery Casings

There are two stockpiles of shredded battery casings at the site; one in the saw building and one located at the south end of the site. The south pile is from the former process operations; it measures about 75 feet in diameter and 8 feet high. The saw building is bulging from the load imposed by the casings that are deposited there. Battery casings are estimated to be 10 feet deep. The total volume of shredded battery casings is estimated to be 3,800 cubic yards. Samples from the shredded casings exceeded the EP toxicity test concentrations for lead and therefore should be classified as a hazardous waste. There was an attempt to render the chips non-hazardous with a water wash but this was not sucessful. These chips are inaccessible to the local population because they are within the locked site compound.

ENFORCEMENT ANALYSIS

The Ohio EPA and the Ohio Attorney General's Office initiated various investigations and enforcement proceedings beginning in 1964. The owner's cleanup efforts were never satisfactory, but before any penalties could be pursued, he closed the site in December 1982. The State's efforts were instrumental in getting the site on the National Priority List also in December 1982.

In 1983 the Ohio Attorney General's Office continued its efforts to get the owner to take clean up actions outside of the Superfund program. In October 1983 the negotiations to get the non-remedial actions done were terminated due to lack of good faith bargaining on the owner's part. Meanwhile, the U.S. EPA had written a Remedial Action Master Plan on how to proceed at the AIM site.

On February 13, 1984, a notice letter from the U.S. EPA's Director of the Waste Management Division in Region V was sent to the owner and former operator of the site informing him that a Remedial Investigation and

Feasibility Study (RI/FS) would be performed at the AIM site. The owner decided not to fund the RI/FS. On July 22, 1986, a notice letter was again sent to the owner to give him the opportunity to execute the chosen remedy detailed in the FS. It is unlikely the owner will perform the recommended remedial action, thus monies from the Superfund Trust Fund will be expended.

ALTERNATIVES EVALUATION

Public Health and Environmental Objectives

The selection process used to obtain a single recommended assembled alternative as described in the NCP, Section 300.68 (i) Selection of Remedy, is one that provides for "selection of a cost-effective remedial alternative which effectively mitigates and minimizes threats to and provides adequate protection of public health, welfare and the environment. This will require selection of a remedy which attains or exceeds applicable or relevant Federal public health or environmental standards."

The adequacy of protection of public health, welfare, and the environment, provided by each alternative was evaluated based on the alternative's attainment of substantive provisions of other Federal public health and environmental standards. In areas of concern where no standards are available, Acceptable Daily Intake (ADI) levels and a statement from the Centers for Disease Control were used to guide the selection process. The following list identifies EPA's specific public health and environmental objectives for remedial action at the Arcanum Iron & Metal Site and the Federal Standards and/or guidelines used to attain the objectives:

- To prevent direct contact with contaminated onsite and offsite soil. ADI levels for lead and CDC's published statement concerning elevated lead levels in children were used as guidelines.

- To maintain safe drinking water for the population that could be affected by groundwater contamination. The applicable portions of the National Primary Drinking Water Regulations (40 C.F.R. Part 141) were used.

- To prevent contaminant migration via surface water run-off from the site and to prevent direct contact of contaminated sediment in Sycamore Ditch. Sediment con-

tamination was evaluated using the same guidelines imposed on soil.

- To prevent contaminant migration via direct contact with contaminated structures on site. To prevent contaminant migration via abandoned utilities. Soil guidelines were used.

- To eliminate the direct contact threat and the possibility of leaching contaminants to groundwater posed by the above ground, onsite storage of battery casing chips. Soil guidelines were used.

Alternatives Considered

The assembled alternatives (AA) considered (Table 2) are presented in operable units according to the category of remedial action under which they fall. The alternatives were assembled in this manner to provide a range of acceptable options to be evaluated in detail. The five different operable units were needed to address the different routes of contaminant migration.

Soil - Onsite Source Control Measures

The detailed evaluation of an available soil treatment technology was considered. The technology involved washing the soil with a solvent, EDTA*, to reduce the lead content in the soil and to recover the lead in the solvent. It was determined that the soils at this site were too high in clay content to be treated with EDTA. Therefore, excavation options to various safe lead clean up levels were considered.

AA-1	Excavate soil to background lead concentrations. Dispose of soil offsite.
AA-2	Excavate soil to 100mg/kg lead concentration. Dispose of soil offsite.
AA-3	Excavate soil to 500mg/kg lead concentration. Dispose of soil offsite.
AA-4	Excavate soil to 1000mg/kg lead concentration. Dispose of soil offsite.
AA-6	No Action

* Ethylenediaminetetraacetic acid.

Table 2

Assembled Alternatives for Remedial Action at the AIM Site

AA-1. Soil Removal to Lead Concentrations Below 30 mg/kg	AA-2. Soil Removal to Lead Concentrations Below 100 mg/kg	AA-3. Soil Removal to Less Than 500 mg/kg	AA-4. Soil Removal to Lead Concentrations Below 1,000 mg/kg with Capping	AA-5. Capping	AA-6. No Action.
Soil	Soil	Soil	Soil	Soil	Soil
Remove onsite and offsite soil to background concentration with disposal at a RCRA compliant landfill. Estimated volume 39,000 cu yds. Add gypsum to all onsite and offsite soil areas, backfill the excavation, grade and revegetate.	Excavate onsite soil with lead concentrations greater than 100 mg/kg, and excavate offsite soil with lead concentrations greater than 30 mg/kg. Backfill the excavation, gypsum addition to all onsite and offsite soil areas, grade and revegetate. Disposal at a RCRA compliant landfill of soil from on and offsite areas with lead concentrations greater than 100 mg/kg. Estimated volume 33,000 cu yds. Onsite disposal of soil from offsite areas with lead concentrations between 30 and 100 mg/kg.	Excavate onsite soil with lead concentrations greater than 500 mg/kg, and excavate offsite soil with lead concentrations greater than 30 mg/kg. Backfill the excavation, gypsum addition to all onsite and offsite soil areas, grade and revegetate. Disposal at a RCRA compliant landfill of soil from on and offsite with lead concentrations greater than 500 mg/kg. Estimated volume 20,000 cu yds. Onsite disposal of soil from offsite areas with lead concentrations between 30 and 500 mg/kg.	Excavate and remove onsite and offsite soil with lead concentrations greater than 1,000 mg/kg for offsite disposal at a RCRA compliant facility. Estimated volume 20,000 cu yards. Excavate offsite soil with lead concentrations between 30 and 1,000 mg/kg and place onsite for disposal. Gypsum addition to all onsite and offsite areas, backfill, grade and cap and revegetate the site.	Excavate offsite soil with lead concentrations greater than 30 mg/kg and place onsite. Clear and grub site, add gypsum to all onsite and offsite soil areas, grade, cap and revegetate the site.	No Action.
Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Continue monitoring. Install additional monitoring wells and sample biannually. Includes sampling nearby residential wells. Assess potential need for an extraction and treatment system, based on additional monitoring data.	Same as AA-1.	Same as AA-1.	Same as AA-1.	Same as AA-1.	No Action.
Surface Water and Sediment	Surface Water and Sediment	Surface Water and Sediment	Surface Water and Sediment	Surface Water and Sediment	Surface Water and Se
Remove and replace approx. 1,700 feet of storm sewer between site and Sycamore Ditch. Dredge 1,200 feet of Sycamore Ditch. Disposal of contaminated sediment at RCRA compliant landfill.	Same as AA-1.	Remove and replace approximately 1,700 feet of storm sewer between site and Sycamore Ditch. Dredge 1,200 feet of Sycamore Ditch. Dispose of sediment onsite and cover with clean fill material.	Same as AA-3.	Remove and replace appoximately 1,700 feet of offsite storm sewer between site and Sycamore Ditch. Dredge 1,200 feet of Sycamore Ditch. Dispose of sediments onsite. Cap the sediment along with the soil.	No Action.

Table 2

Assembled Alternatives for Remedial Action at the AIM Site

	Facilities	Battery Casings Stockpiles	Cost[a,b]								
			Present Worth	Capital Cost	O&M Cost	Present Worth	Capital Cost	O&M Cost	Present Worth	Capital Cost	O&M Cost
AA-1[c]	Decontaminate saw building, collect and treat decontamination solutions. Sludge disposal offsite at RCRA compliant landfill. Remove existing onsite storm sewer.	Remove shredded battery casings from the saw building and the onsite storage pile and dispose of offsite at RCRA compliant facility.	$18,427,000	$18,078,000	$37,000	$17,342,000	$16,993,000	$37,000	$10,278,000	$9,929,000	$37,000
AA-2	Same as AA-1.	AA-2 includes removal and offsite disposal of stockpiled battery casings at a RCRA compliant facility. Washing of battery casings followed by offsite disposal at a RCRA permitted facility is an option.	$11,177,000	$10,745,000	$46,000	3,797,000	$3,365,000	$46,000	$0	$0	$0
AA-3	Demolish saw building and dispose offsite at a RCRA permitted facility. Remove existing onsite storm sewer.	Same as AA-2.	Same as AA-2.			Same as AA-2, AA-3.			Same as AA-2,3,4.		
AA-4	Same as AA-3.	Same as AA-2, AA-3.	Same as AA-2,3,4.								
AA-5	No Action.	No Action.									

[a] Cost estimates for Alternatives 1 to 5 do not include optional groundwater extraction and treatment of battery casings. Selection of these optional remedial actions would increase present worth estimate by $7,710,000

[b] Cost estimates are based on 1986 dollars.

[c] AA - Assembled Alternative

Soil - Offsite Measures

AA-1	Excavate soil to background lead concentrations. Dispose of soil offsite.
AA-2	Excavate soil above 100mg/kg lead concentration. Dispose of soil offsite. Excavate soil between 30mg/kg and 100mg/kg lead and place onsite.
AA-3	Excavate soil above 500mg/kg lead concentration and dispose of this soil offsite. Excavate soil between 30mg/kg and 500mg/kg lead and place onsite.
AA-4	Excavate soil above 1000mg/kg and dispose of this soil offsite. Excavate soil between 30mg/kg and 1000mg/kg and place onsite.
AA-5	Excavate offsite soil with lead concentrations greater than 30mg/kg lead concentrations and place onsite.
AA-6	No Action

Soil - Closure Activities

AA-1,2,3	Backfill excavated areas with clean soil, treat the remaining soil with gypsum to promote immobilization of the lead, grade and revegetate.
AA-4,5	These alternatives would incorporate all the activities in AA-1,2,3 but in addition would include a RCRA cap over the contaminated onsite area.
AA-6	No Action

Groundwater - Offsite Measures

AA-1,2,3,4,5	Install offsite monitoring wells to detect offsite

contaminant migration. Optional pump and treat based on contaminant levels.

AA-6 No Action.

Surface Water and Sediment - Offsite Measures

AA-1,2 Remove and replace offsite storm sewer. Dredge contaminated sediments from Sycamore Ditch and dispose of them offsite.

AA-3,4,5 Remove and replace offsite storm sewer. Dredge contaminated sediments from Sycamore Ditch and dispose of them onsite.

AA-6 No Action.

Surface Water and Sediment - Closure Activities

AA-3,4,5 Treat sediments brought onsite with gypsum. Cover with clean fill along with the soil.

AA-6 No Action.

Facilities - Onsite Source Control

AA-1,2 Decontaminate the "saw" building, collect and treat the decon solutions, dispose of sludge offsite. Remove existing onsite storm sewer.

AA-3,4,5 Demolish the "saw" building, dispose of offsite. Remove existing onsite storm sewer and dispose of offsite.

AA-6 No Action.

Battery Casings Stockpile - Onsite Source Control

AA-1,2,3,4,5 Remove battery casings onsite and dispose of offsite.

AA-2,3,4,5 Treatment Option - Treatment technology to recover lead

from the casings was believed to be potentially feasible. It remains an option even though the final recommended alternative does not include it. See explanation on page 16.

AA-6 No Action.

There are no strictly onsite alternatives. The onsite RCRA landfill alternative in the FS was eliminated because offsite disposal allows for future use of the site and the associated long-term monitoring would not be required. Assembled Alternative 5 provides for disposal of contaminated onsite/offsite soils under a RCRA cap, but the battery casings would be removed from the site. This alternative would fully comply with RCRA closure requirements.

Other than health considerations, the assembled alternatives were evaluated by applying technical, environmental, and cost criteria. The definitions of these criteria and their subparts appear in the Feasibility Study in Chapter 3 and the results of applying them are summarized in Table 3.

The final assembled remedial alternatives were screened based on the threat to the public via direct contact with the lead contamination at the site and on cost effectiveness, i.e., how well the public health and environmental goals would be met for the estimated cost of the alternative.

COMMUNITY RELATIONS

There has been moderate community interest at the Arcanum Iron and Metal (AIM) site.

Approximately 25 residents and local officials attended each of the public meetings. The first of two meetings was held in July, 1984 to brief residents on planned Superfund actions at the site. At that meeting, residents and officials were most concerned about a pile of battery casings on the site. They expressed concern that the casings were unsightly and could create an airborne contamination problem.

A second meeting was held in July 1986 to present the results of the Remedial Investigation and Feasibility Study. The concerns at that meeting were mostly about when the site would be cleaned up and the issue of who should pay for the cleanup. The farmer adjacent to the site had specific comments in the choice of remedy as it affected his property. The comments of record along with EPA's responses to the comments are listed in Appendix A.

Table 5 (Page 1 of 9)
EVALUATION OF ASSEMBLED ALTERNATIVES

Assembled Alternative Number	Title and Description of Assembled Alternative	Evaluation Criteria: Technical — Reliability	Technical — Implementability	Technical — Safety	Environmental — Short-Term (Construction)	Environmental — Long-Term (Operation)	Environmental — Institutional	Environmental — Public Safety	Cost[a,b] — Present Worth	Cost — Capital Cost	Cost — O&M Cost
1	Soil Removal to Lead Concentrations Below 30 mg/kg								$18,427,000	$18,078,000	$37,000
	Soil Remove onsite and offsite soil to background concentration with disposal at a RCRA-compliant landfill. Add gypsum to all onsite and offsite soil areas, backfill the excavation, grade and revegetate.	++ Removes soil contaminants, removes future source of contamination for surface water or groundwater.	- Requires excavation, transport, and disposal of soil. Must import large quantities of soil to site. May require permission to excavate offsite areas.	- Potential contaminant exposure to work force during construction.	- Increased truck traffic, dust generation and noise. Requires removing 2,500 truck loads of soil for offsite disposal.	++ Source of future contamination to surface water and groundwater eliminated.	++ Soil removed to background will allow for future use of site.	++ Minimizes contaminant exposure to the public.			
	Groundwater Continue monitoring. Install additional monitoring wells and sample biannually. Includes sampling nearby residential wells. Assess potential need for an extraction and treatment system, based on additional monitoring data.	+ Provides for potential detection of future contamination or migration of existing groundwater contamination. Provides for potential future implementation of an extraction and treatment system.	++ Relatively simple to implement.	- Potential contaminant exposure to work force during construction.	+ Installation of wells will cause little disturbance.	- Potential for migration of existing contaminated groundwater.	- Limits future groundwater use at the site.	+ Reduces potential contaminant exposure to public by detection of changes in contaminant concentrations.			
	Surface Water and Sediment Remove and replace approx. 1,700 ft of storm sewer between site and Sycamore Ditch and dredge 1,200 ft of Sycamore Ditch. Disposal of contaminated spoils at RCRA-compliant landfill.	++ Provides adequate drainage, reduces flooding potential, removes potential source of continuing contamination (existing offsite storm sewer), removes contaminated sediments.	o Requires dredging, transportation, and offsite disposal of approximately 450 cubic yards of sediment.	o Potential contaminant exposure to work force during construction.	- Increased truck traffic, dust generation and noise. Possible resuspension of sediment contaminants.	+ Potential source of contamination (existing offsite storm sewer) removed, reduced flooding potential. Sediment contamination reduced.	- Storm sewer replacement may disrupt rail service.	+ Reduces potential contaminant exposure to the public.			

Assembled Alternative Number	Title and Description of Assembled Alternative	Technical			Environmental				Cost[a,b]		
		Reliability	Implementability	Safety	Short-Term (Construction)	Long-Term (Operation)	Institutional	Public Safety	Present Worth	Capital Cost	O&M Cost
	Facilities Decontaminate saw building, collect and treat decontamination solutions, sludge disposal at RCRA-compliant landfill, and remove existing onsite storm sewer.	+ Removes contaminants from saw building, eliminates future contamination due to onsite storm sewer.	o Collection and treatment of decontamination solution would be the most difficult to implement. Monitoring would be required. Exact location and quantity of existing onsite storm sewer unknown.	- Potential contaminant exposure to work force during construction.	- Increased truck traffic, dust generation and noise.	++ Potential source of future contamination eliminated. Future use of saw building is possible.	+ Building decontamination allows future use.	+ Minimizes contaminant exposure to the public.			
	Battery Casings Stockpile Remove shredded battery casings from the saw building and the onsite storage pile and dispose of at RCRA-compliant facility. Conduct engineering studies to determine feasibility of washing battery casings.	++ Remove contaminants from the site.	o Requires transport and disposal of contaminated casings. Can be implemented relatively quickly.	o Potential contaminant exposure to work force during removal.	- Increased truck traffic, dust generation and noise. Requires removing approximately 1,900 truck loads of material.	++ Potential source of future contamination to groundwater and surface water eliminated. Removes potential for direct contact.	+ Removal improves possibility for reusing site and saw building.	++ Minimizes public exposure to contaminants.			
2	Soil Removal to Lead Concentrations Below 100 mg/kg								$17,342,000	$16,993,000	$37,000
	Soil Excavate onsite soil with lead concentrations greater than 100 mg/kg, and excavate offsite soil with lead concentrations greater than 30 mg/kg. Backfill the excavation, gypsum addition to all onsite and offsite soil areas, grade and revegetate. Disposal at a RCRA-compliant landfill of soil from on and offsite areas with lead concentrations greater than 100 mg/kg. Onsite disposal of soil from offsite areas with lead concentrations between 30 and 100 mg/kg.	+ Removes highly contaminated soils, reduces potential of future surface water and groundwater contamination.	- Requires excavation, transport, and disposal of contaminated soils. Must import large quantities of soil for cover materials. May require permission to excavate offsite areas.	- Potential contaminant exposure to work force during construction.	- Increased truck traffic, dust generation, and noise. Requires approximately 2,100 truck loads for hauling of soil for offsite disposal.	+ Reduced potential for future contamination of surface water and groundwater.	+ Soil removal will allow for limited reuse of the site.	+ Reduces contaminant exposure to the public.			

Table 3 (Page 3 of 9)

Assembled Alternative Number	Title and Description of Assembled Alternative	Technical			Environmental				Cost[a,b]		
		Reliability	Implementability	Safety	Short-Term (Construction)	Long-Term (Operation)	Institutional	Public Safety	Present Worth	Capital Cost	O&M Cost
	Groundwater Continue monitoring. Install additional monitoring wells and sample biannually. Includes sampling nearby residential wells. Assess potential need for an extraction and treatment system, based on additional monitoring data.	+ Provides for potential detection of future contamination or migration of existing groundwater contamination. Provides for potential future implementation of an extraction and treatment system.	++ Relatively simple to implement.	- Potential contamination exposure to work force during construction.	+ Installation of wells will cause little disturbance.	- Potential for migration of existing contaminated groundwater.	- Limits future groundwater use at the site.	+ Reduces potential contaminant exposure to the public by detection of changes in contaminant concentrations.			
	Surface Water and Sediment Remove and replace approximately 1,700 ft of storm sewer between site and Sycamore Ditch. Dredge 1,200 ft of Sycamore Ditch and dispose of spoils at a RCRA-compliant facility.	++ Provides adequate drainage, reduces flooding potential, removes potential source of continuing contamination (existing offsite storm sewer).	0 Requires dredging, transportation, and offsite disposal of approximately 450 cubic yards of sediment.	0 Potential contaminant exposure to work force during construction.	- Increased truck traffic, dust generation and noise.	+ Potential source of contamination (existing offsite storm sewer) removed, reduced flooding potential.	- Storm sewer replacement may disrupt rail service.	+ Reduces potential contaminant exposure to the public.			
	Facilities Decontaminate saw building, collect and treat decontamination solutions, sludge disposal at a RCRA-compliant landfill, and remove existing onsite storm sewer.	+ Removes contaminants from saw building, eliminates future contamination due to onsite storm sewer.	0 Collection and treatment of decontamination solution would be the most difficult item to implement. Monitoring would be required. Exact location and quantity of existing onsite storm sewer unknown.	- Potential contaminant exposure to work force during construction.	- Increased truck traffic, dust generation, and noise.	++ Potential source of future contamination eliminated. Future use of saw building possible.	+ Building decontamination allows future use.	+ Minimizes contaminant exposure to the public.			

Assembled Alternative Number	Title and Description of Assembled Alternative	Technical			Environmental				Cost[a,b]		
		Reliability	Implementability	Safety	Short-Term (Construction)	Long-Term (Operation)	Institutional	Public Safety	Present Worth	Capital Cost	O&M Cost
	Battery Casings Stockpile Remove shredded battery casings from the saw building and the onsite storage pile and dispose of at RCRA-compliant facility. Conduct engineering studies to determine feasibility of washing battery casings.	++ Removes contaminants from the site.	o Requires transport and disposal of contaminated casings. Can be implemented relatively quickly.	o Potential contaminant exposure to work force during removal.	- Increased truck traffic, dust generation, and noise. Requires removing approximately 1,900 truck loads of material.	++ Potential source of future contamination to groundwater and surface water eliminated. Removes potential for direct contact.	+ Removal improves possibility for reusing site and saw building.	++ Minimizes public exposure to contaminants.			
3	Soil Removal to Less Than 500 mg/kg								$10,278,000	$9,929,000	$37,000
	Soil Excavate onsite soil with lead concentrations greater than 500 mg/kg, and excavate offsite soil with lead concentrations greater than 30 mg/kg. Backfill the excavation, gypsum addition to all onsite and offsite soil areas, grade and revegetate. Disposal at a RCRA-compliant landfill of soil from on and offsite areas with lead concentrations greater than 500 mg/kg. Onsite disposal of soil from offsite areas with lead concentrations between 30 and 500 mg/kg.	+ Removes highly contaminated soils, reduces potential of future surface water and groundwater contamination.	- Requires excavation of soil, transport and disposal of contaminated soils. Must import large quantities of soil for cover materials. May require permission to excavate offsite.	- Potential contaminant exposure to work force during construction.	- Increased truck traffic, dust generation, and noise. Requires approximately 1,200 truck loads for hauling of soil.	+ Reduced potential for future contamination of surface water and groundwater.	+ Soil removal will allow for limited reuse of the site.	+ Reduces contaminant exposure to the public.			
	Groundwater Continue monitoring. Install additional monitoring wells and sample biannually. Includes sampling nearby residential wells. Assess potential need for an extraction and treatment system, based on additional monitoring data.	+ Provides for potential detection of future contamination or migration of existing groundwater contamination. Provides for potential future implementation of an extraction and treatment system.	++ Relatively simple to implement.	- Potential contamination exposure to work force during construction.	+ Installation of wells will cause little disturbance.	- Potential for migration of existing contaminated groundwater.	- Limits future groundwater use at the site.	+ Reduces potential contaminant exposure to the public by detection of changes in contaminant concentrations.			

Assembled Alternative Number	Title and Description of Assembled Alternative	Technical			Environmental				Cost[a,b]		
		Reliability	Implementability	Safety	Short-Term (Construction)	Long-Term (Operation)	Institutional	Public Safety	Present Worth	Capital Cost	O&M Cost
	Surface Water and Sediment Remove and replace approximately 1,700 ft of storm sewer between site and Sycamore Ditch. Dredge 1,200 ft of Sycamore Ditch and dispose of spoils onsite and cover with clean fill material.	++ Provides adequate drainage, reduces flooding potential, removes potential source of continuing contamination (existing offsite storm sewer).	+ Relatively simple to implement.	0 Potential contaminant exposure to work force during construction.	- Increased truck traffic, dust generation and noise.	+ Potential source of contamination (existing offsite storm sewer) removed, reduced flooding potential.	- Storm sewer replacement may disrupt rail service.	+ Reduces potential contaminant exposure to the public.			
	Facilities Demolish saw building with disposal at a RCRA-permitted facility. Remove existing onsite storm sewer.	++ Removes contaminated saw building, eliminates future contamination due to onsite storm sewer.	+ Relatively simple to implement. Exact location and quantity of existing onsite storm sewer unknown.	- Potential contaminant exposure to work force during demolition.	- Increased truck traffic, dust generation, and noise. Truck hauling of demolition rubble may disturb community.	++ Potential source of future contamination eliminated.	+ Contaminated building and storm sewer removed.	+ Public exposure to contaminated structure minimized. Potential source of future contamination.			
	Battery Casings Stockpile Remove shredded battery casings from the saw building and the onsite storage pile and dispose of at RCRA-compliant facility. Conduct engineering studies to determine feasibility of washing battery casings.	++ Removes contaminants from the site.	0 Requires transport and disposal of contaminated casings. Can be implemented relatively quickly.	0 Potential contaminant exposure to work force during removal.	- Increased truck traffic, dust generation, and noise. Requires removing approximately 1,900 truck loads of material.	++ Potential source of future contamination to groundwater and surface water eliminated. Removes potential for direct contact.	+ Removal improves possibility for reusing site and saw building.	++ Minimizes public exposure to contaminants.			
									$11,177,000	$10,745,000	$46,000
4	Soil Removal to Lead Concentrations Below 1,000 mg/kg with Capping										
	Soil Excavate and remove onsite and offsite soil with lead concentrations greater than 1,000 mg/kg for offsite disposal at a RCRA-compliant facility. Excavate offsite soil with lead concentrations between 30 and 1,000 mg/kg and place onsite for disposal. Gypsum	0 Removes soil contaminants from area contaminated. Reduces potential of future surface water contamination. Potential for future ground-	+ Relatively simple to implement. Requires excavation, transportation and disposal of contaminated soils. May require permission to	- Potential contaminant exposure to work force during construction.	- Increased truck traffic, dust generation, and noise. Requires approximately 1,200 truck loads to haul excavated	0 Reduced potential for future surface water contamination. Potential for future groundwater contamination exists.	0 Contaminated soil and the cap may limit future use of site.	+ Reduces contaminant exposure to the public.			

Assembled Alternative Number	Title and Description of Assembled Alternative	Technical			Environmental				Cost[a,b]		
		Reliability	Implementability	Safety	Short-Term (Construction)	Long-Term (Operation)	Institutional	Public Safety	Present Worth	Capital Cost	O&M Cost
	addition to all onsite and offsite areas, backfill, grade, and cap, and revegetate the site.	water contamination.	excavate offsite.		soil for offsite disposal.						
	Groundwater Continue monitoring. Install additional monitoring wells and sample biannually. Includes sampling nearby residential wells. Assess potential need for an extraction and treatment system, based on additional monitoring data.	+ Provides for detection of future contamination or migration of existing groundwater contamination. Provides for potential future implementation of an extraction and treatment system.	++ Relatively simple to implement.	- Potential contaminant exposure to work force during construction.	+ Installation of wells will cause little disturbance.	- Potential for migration of existing contaminated groundwater.	- Limits future groundwater use at the site.	+ Reduces potential contaminant exposure to the public by detection of changes in contaminant concentrations.			
	Surface Water and Sediment Remove and replace approximately 1,700 ft of storm sewer between site and Sycamore Ditch. Dredge 1,200 ft of Sycamore Ditch and dispose of spoils onsite.	++ Provides adequate drainage, reduces flooding potential, reduces potential of future contamination due to existing offsite storm sewer.	+ Relatively simple to implement.	o Potential contaminant exposure to work force during construction.	- Increased truck traffic, dust generation and noise.	o Potential source of contamination (existing offsite storm sewer) removed, reduced flooding potential.	- Storm sewer replacement may disrupt rail service.	+ Reduces potential contaminant exposure to the public.			
	Facilities Demolish saw building with disposal at RCRA-permitted facility. Remove existing onsite storm sewer.	++ Removes contaminated saw building, eliminates future contamination due to onsite storm sewer.	+ Relatively simple to implement. Exact location and quantity of existing onsite storm sewer unknown.	- Potential contaminant exposure to work force during demolition.	- Increased truck traffic, dust generation, and noise. Truck hauling of demolition rubble may disturb community.	++ Potential source of future contamination eliminated.	+ Contaminated building and storm sewer removed.	+ Potential source of future contamination eliminated. Public exposure to contaminated structure minimized.			

Assembled Alternative Number	Title and Description of Assembled Alternative	Technical			Environmental				Cost[a,b]		
		Reliability	Implementability	Safety	Short-Term (Construction)	Long-Term (Operation)	Institutional	Public Safety	Present Worth	Capital Cost	O&M Cost
	Battery Casings Stockpile Remove shredded battery casings from the saw building and the onsite storage pile and dispose of at RCRA-compliant facility. Conduct engineering studies to determine feasibility of washing battery casings.	++ Removes contaminants from the site.	o Requires transport and disposal of contaminated casings. Can be implemented relatively quickly.	o Potential contaminant exposure to work force during removal.	- Increased truck traffic, dust generation, and noise. Requires removing approximately 1,900 truck loads of material.	++ Potential source of future contamination to groundwater and surface water eliminated. Removes potential for direct contact.	+ Removal improves possibility for reusing site and saw building.	++ Minimizes public exposure to contaminants.			
									$3,797,000	$3,365,000	$46,000
5	Capping										
	Soil Excavate offsite soil with lead concentrations greater than 30 mg/kg and place onsite. Clear and grub site, add gypsum to all onsite and offsite soil areas, grade, cap, and revegetate the site.	- Does not remove soil contaminants. Reduces potential for future surface water and groundwater contamination.	++ Simple to implement. May require permission to excavate offsite.	- Potential contaminant exposure to work force during construction.	- Increased truck traffic, dust generation, and noise.	- Potential for surface water and groundwater contamination remains.	- Contaminated soil and the cap may limit future use of site.	o Reduces contaminant exposure to the public.			
	Groundwater Continue monitoring. Install additional monitoring wells and sample biannually. Includes sampling nearby residential wells. Assess potential need for an extraction and treatment system, based on additional monitoring data.	+ Provides for potential detection of future contamination or migration of existing groundwater contamination. Provides for potential implementation of an extraction and treatment system.	++ Relatively simple to implement.	- Potential contaminant exposure to work force during construction.	+ Installation of wells will cause little disturbance.	- Potential for migration of existing contaminated groundwater.	- Contaminated groundwater not removed. Limits future groundwater use at the site.	+ Reduces potential contaminant exposure to the public by detection of changes in contaminant concentrations.			
	Surface Water and Sediment Remove and replace approximately 1,700 ft of offsite storm sewer between site and Sycamore Ditch. Dredge 1,200 feet of Sycamore Ditch and dispose of spoils onsite.	++ Provides adequate drainage, reduces flooding potential, removes potential source of continuing contam-	+ Relatively simple to implement.	o Potential contaminant exposure to work force during construction.	- Increased truck traffic, dust generation and noise. Disruption of agricultural	o Potential source of contamination (existing storm sewer) removed, reduced flooding	- Storm sewer replacement may disrupt rail service.	+ Reduces potential contaminant exposure to the public.			

Assembled Alternative Number	Title and Description of Assembled Alternative	Technical			Environmental				Cost[a,b]		
		Reliability	Implementability	Safety	Short-Term (Construction)	Long-Term (Operation)	Institutional	Public Safety	Present Worth	Capital Cost	O&M Cost
		ination (existing offsite storm sewer).			activities and rail service.	potential.					
	Facilities Demolish saw building with disposal at RCRA-permitted facility. Remove existing onsite storm sewer.	++ Removes contaminants from saw building, eliminates future contamination due to onsite storm sewer.	+ Relatively simple to implement. Exact location and quantity of existing onsite storm sewer unknown.	- Potential contaminant exposure to work force during construction.	- Increased truck traffic, dust generation, and noise. Truck hauling of demolition rubble may disturb community.	++ Potential source of future contamination eliminated.	+ Contaminated building and storm sewer removed.	+ Potential source of future contamination eliminated. Public exposure to contaminated structure minimized.			
	Battery Casings Stockpile Remove shredded battery casings from the saw building and the onsite storage pile and dispose of at RCRA-compliant facility. Conduct engineering studies to determine feasibility of washing battery casings.	++ Removes contaminants from the site.	0 Requires transport and disposal of contaminated casings. Can be implemented relatively quickly.	0 Potential contaminant exposure to work force during removal.	- Increased truck traffic, dust generation, and noise. Requires removing approximately 1,900 truck loads of material.	++ Potential source of future contamination to groundwater and surface water eliminated. Removes potential for direct contact.	+ Removal improves possibility for reusing site and saw building.	++ Minimizes public exposure to contaminants.			
6	No Action								$0	$0	$0
	Soil No action.	-- Does not remove soil contaminants, potential for future surface water and groundwater contamination exists.	++ No construction required.	0 No change.	++ No construction related effects.	-- Potential for continuing surface water and groundwater contamination remains.	-- Contaminated soil at surface may make site unusable.	-- Potential for public exposure is high.			
	Groundwater No action.	-- Does not remove contaminated groundwater. Does not provide for detection of future contamination or	++ No construction required.	0 No change.	++ No construction related effects.	-- Potential for continuing groundwater contamination and migration of contaminated groundwater remains.	-- May limit use of onsite and offsite groundwater.	-- Does not provide for contaminant detection and monitoring.			

Assembled Alternative Number	Title and Description of Assembled Alternative	Technical			Environmental				Cost[a,b]		
		Reliability	Implementability	Safety	Short-Term (Construction)	Long-Term (Operation)	Institutional	Public Safety	Present Worth	Capital Cost	O&M Cost
		migration of existing contaminated groundwater.									
	Surface Water and Sediment No action.	-- Flooding potential remains, existing storm sewer remains a source of future contamination, does not remove contaminated sediment.	++ No construction required.	0 No change.	++ No construction related effects.	-- Flooding potential remains, potential source of contamination (existing storm sewer) remains, sediment contaminants remain a source of continuing contamination.	- Continued contaminated runoff.	-- Potential for public exposure is high.			
	Facilities No action.	-- Does not remove source of contaminants.	++ No construction required.	0 No change.	++ No construction related effects.	-- Source of contamination remains.	- Structures may be unusable for future industrial purposes.	-- Potential for public exposure is high.			
	Onsite Battery Casings Stockpile No action.	-- Does not remove source of contaminants.	++ No construction required.	0 No change.	++ No construction related effects.	-- Source of contamination remains. Mobility of contaminants may be high.	-- Structures and site may be unusable for future industrial purposes.	-- Potential for public exposure is high.			

[a] Cost estimates for Alternatives 1 to 5 do not include optional groundwater extraction and treatment or washing of battery casings remedial actions. Selection of these optional remedial actions would increase present worth estimate by $7,710,000.

[b] Cost estimates are based on 1986 dollars.

GLT617/5

CONSISTENCY WITH OTHER ENVIRONMENTAL LAWS

The five action alternatives are required to comply with all applicable or relevant federal regulations. These are highlighted in Chapter 6 of the Feasibility Study. The two federal environmental laws that figured most prominently in the selection process were the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and the Resource Conservation and Recovery Act (RCRA). (Specifically, Subtitle C, concerning the handling of hazardous waste and the Hazardous and Solid Waste Amendments of November 8, 1984, which expanded the requirements and coverage of the already existing RCRA law). The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) 40 CFR Part 300, governs the overall process of how the alternatives were developed and selected pursuant to the CERCLA Act Section 105. Applicable portions of RCRA govern the handling, transporting and storing of any hazardous wastes found onsite. RCRA also governs closure requirements for waste management units.

One final environmental law, the Clean Water Act (CWA), is applicable to this site in so far as the site may be discharging lead to navigable waters via storm water run-off. The implementation of the chosen remedy should prevent any future discharge of lead to Sycamore Ditch. In the unlikely event that a groundwater pump and treat action becomes necessary, requirements of the CWA would be considered before any offsite discharge occurred.

In addition to CERCLA, RCRA and CWA environmental laws, the Procedure for Planning and Supplementing Off-Site Response Actions (Off-Site Policy) published in the Federal Register on November 5, 1985, is a policy adopted by the EPA which "governs the selection of a facility for any off-site storage, treatment of or disposal of hazardous substances which may be necessary" under CERCLA or RCRA. The policy also covers EPA's stand on treatment in connection with CERCLA actions. What this means for this site is: 1) Any offsite landfill chosen for storage of lead contaminated soils must be in compliance with the Solid Waste Amendments of 1984 as they pertain to land disposal facilities; and 2) Treatment, recycling or reuse of wastes must be considered to promote permanent methods of managing hazardous substances. Both of these requirements were addressed in considering alternatives.

The U.S. EPA's decisionmaking process in selecting a remedial action alternative is the functional equivalent of the National Environmental Policy Act (NEPA).

COMPARISON OF ALTERNATIVES

A tabular summary of the assembled alternatives (AA) is presented in Table 2.

The substantial difference between the alternatives involves the soil operable unit. In the discussion that follows, alternatives are compared and eliminated based on the soil operable unit. Table 3 presents the comparison of alternatives in detail.

Assembled Alternative AA-6 - No Action

The no action assembled alternative is ineffective in preventing further contaminant migration and does not reduce the existing contamination at the site. The Exposure Assessment concludes that there is potential for exposure to the public from contaminants at the site at levels that may adversely affect health and welfare. Remedial action is therefore required to reduce or minimize this exposure. Since the stated goal of protecting the public health is not addressed in this alternative, it is eliminated from further consideration. However, it is presented in here and in Table 2 and 3 as a baseline for comparison.

Assembled Alternative AA-5 - Capping (Present Worth Estimate $3.8 million)

The U.S. EPA believes that capping alone, provided by AA-5, may not provide long term protection of groundwater resources because of the nature of the buried materials that would be left onsite: buried shredded battery casings and very high lead soils (maximum found was 56,800 mg/kg). In this case, the stated goals of protecting the public's health and the environment are addressed, but the potential for future problems due to leaching of lead to the groundwater would remain. Therefore, this alternative is eliminated from further consideration.

Assembled Alternatives AA-1 and AA-2 - Soil Removal to Lead Concentrations Below 30 ppm and 100 ppm (Present Worth estimates $18.4 million and $17.3 million respectively)

Assembled alternatives AA-1 and AA-2 have the potential to provide the greatest environmental and public health benefits because of the relatively low lead cleanup levels achieved. However, the actual benefits derived from achieving these levels would not be significantly greater than those derived from the two remaining higher levels (500 ppm and 1000 ppm). This is because there are no residences on the site. Thus, the two lower levels would be more appropriate if the site were zoned for residential uses. Since the cost of AA-1 and AA-2 are about twice as much as the two remaining and do not provide substantially greater public health and environmental benefits, they were eliminated from further consideration.

Assembled Alternatives AA-3 and AA-4 - Soil Removal to Lead Concentrations Below 500 ppm and 1000 ppm/Capping (Present Worth estimates $10.3 million and $11.2 million respectively)

Alternative 4 would leave approximately 1000 ppm lead in the soil onsite under a RCRA cap. Since AA-3 and AA-4 have similar environmental and public health benefits, the U.S. EPA chose the more conservative level of 500 ppm. Under AA-3, the site would be left with a maximum lead soil level of 500 ppm and the excavated areas would be covered with clean topsoil. This alternative is preferable to a RCRA compliant cap that must be maintained and which would severely limit the future use of the site. The existing information provided by the Exposure Assessment and the Centers for Disease Control form the health basis for recommending assembled alternative AA-3 for the Arcanum site.

DETAILED SUMMARY OF THE U.S. EPA's RECOMMENDED ALTERNATIVE

The present worth of the U.S. EPA's recommended alternative, AA-3, is $10.3 million with an annual O&M cost of $37,000 and consists of these elements:

Soil

- Detailed soil testing and analysis of lead, antimony, and arsenic during remedial design and cleanup to more accurately define the depth and areal extent of onsite and offsite soil contamination.
- Excavation of contaminated soil onsite with lead concentrations above 500 mg/kg with disposal at an existing RCRA compliant landfill, assumed to be located 600 miles from the AIM site for cost estimating purposes. Estimated volume is 20,000 cu yards.
- Excavation of the soil from offsite areas with lead concentrations between 30 mg/kg and 500 mg/kg and placement onsite to be covered with clean fill and graded to promote site drainage.
- Soil left onsite with lead concentrations between 30 mg/kg and 500 mg/kg will be tested for EP toxicity or equivalent at the time of Remedial Action. Soil which fails the toxicity test will be disposed of at a RCRA Subtitle C compliant landfill.

  Currently RCRA is using the EP toxicity test as one means to characterize a hazardous waste. It may be replaced by a different test before Remedial Action.

- Gypsum addition to all onsite and offsite soil excavation areas to further immobilize remaining lead. The U.S. EPA believes that this treatment, together with the local geology, will prevent the further migration of lead to the groundwater.

- Gypsum addition to soils going offsite to a RCRA Subtitle C landfill. The U.S. EPA believes that hazardous substances taken from an NPL site should be treated before disposal offsite.

Groundwater

- Installation of additional monitoring wells offsite and hydraulically downgradient from the site. Continue monitoring these and residential wells to assess potential need for the groundwater extraction and treatment system. Test for VOC's periodically along with the inorganic parameters.

- Conduct soil column leach tests on the remaining gypsum treated soil during remedial action to assess whether soil removal to the 500 mg/kg lead concentration provides for long term protection of groundwater resources in the site area.

- If the groundwater pump and treat option is exercised, the technical requirements of an NPDES permit must be met.

Surface Water and Sediment

- Install a new, larger offsite storm pipe between the adjacent farmer's fields to improve site drainage. The technical requirements of an NPDES permit must be met.

- Clean out the existing offsite storm sewer to rid the pipe of any residual site contamination. Prevent site surface drainage from entering this pipe via plug or similar device.*

- Dredging of sediment from approximately 1,200 feet of Sycamore Ditch with lead concentrations between 30 and 500 mg/kg to be dried, treated with gypsum, and placed onsite beneath the clean fill cover material. Dredging is expected to be conducted during a low water flow period in the ditch to minimize drying and storage requirements and sediment migration caused by the dredging operation.

Facilities

- Detailed structural and contaminant evaluation of the onsite buildings, utilities, and other site facilities during remedial design to determine the best method to deal with each one: decontamination, or demolition and disposal.

* The extent of contamination and the condition of the pipe may precipitate further actions.

° Either demolition with offsite disposal, or decontamination of the onsite buildings, utilities, and other site facilities, depending on the results of the facilities evaluation. (Demolition was assumed for costing purposes.)

Battery Casings

° Disposal of the battery casing chips at a RCRA Subtitle C compliant landfill.

During the FS period, the U.S. EPA evaluated an innovative technology involving washing and treating the battery casing chips for metallic lead recovery. The present worth estimate for the treatment system, including washing 3,800 cubic yards of battery casing chips and disposing of the chips at RCRA-permitted landfill* approximately 125 miles from the Arcanum site, is $9,442.00. In comparison, the present worth cost of directly disposing of the battery casing chips in a RCRA compliant landfill is $1,157,000.

Although the above-described RCRA compliant disposal option meets all present applicable and relevant federal standards, regulations, and criteria and is considerably less costly, the NCP encourages the evaluation of innovative treatment technologies as alternatives to the direct landfilling of hazardous materials. The FS revealed that the existing treatment technology is not feasible at this particular site. In addition, treatment of the chips would not provide substantially greater public health or environmental protection at the AIM site than direct disposal at a RCRA compliant landfill. Therefore, direct disposal of the battery casing chips is recommended.

In anticipation of future land disposal restrictions, however, it is consistent to recommend in this Record of Decision, that in addition to taking the battery casings offsite to a RCRA Subtitle C compliant landfill, treatability studies on the battery casings be performed to determine a way to render the waste nonhazardous before landfilling. The treatability studies will be performed during the design phase of this project, and if sufficiently successful, treatment could be performed before disposing of the wastes offsite. The treated battery casings will be disposed of at a RCRA Subtitle C landfill.

General

° Attempt deed restrictions to limit future use of the site.

The restrictions would prohibit future development of the land for residences. Also, the deed restrictions would prohibit the use of groundwater beneath the site or the installation of wells onsite.

* The nearest RCRA interim status site was used in this cost estimate. The site would have to be in compliance with RCRA Subtitle C requirements at the time of Remedial Action.

STATE ASSURANCES

Section 104 (c)(3) of CERCLA sets forth the State financial responcibility in remedial actions provided under CERCLA. The State financial responsibilites in the proposed remedial action would include payment or assurance of payment of 10% of the costs of remedial action and assurance of all future maintenance costs of the remedial action.

The Ohio EPA will send the Region V Regional Administration a letter acknowledging the State's financial obligations in this remedial action.

The Operation and Maintenance costs will be covered under a State Superfund Contract between the State and the U.S. EPA at the completion of design of the five operable units.

OPERATION AND MAINTENANCE (O & M)

The estimated present worth of groundwater monitoring is $378,000. The budget includes installation of 12 additional monitoring wells downgradient of the site and the costs associated with mobilizing a crew for 5 days every 6 months for a 30 year period to collect samples. The samples would include nearby residential wells. Analytical costs are included in the estimate. Annual O&M is estimated at $37,000. The U.S. EPA is responsible for 90% of the cost for the first year of O&M and the Ohio EPA is responsible for the remaining 10%. Subsequent years are solely the responsibility of the Ohio EPA.

SCHEDULE

Complete Enforcement Negotiations	August, 1986
Approve Remedial Action (sign ROD)	September 16, 1986
Start Remedial Design	October 1, 1986
Complete Remedial Design	October 1, 1987
Invitation for Bid	August 2, 1987
State Superfund Contract	November 2, 1987
Start Construction	November 2, 1987
Complete Construction	May 1, 1989

FUTURE ACTIVITIES

In anticipation of future land disposal restrictions on solid hazardous wastes, the U.S. EPA recommends performing treatability studies on the battery casings with the goal being to render them non-hazardous. The costs incurred for doing treatability studies during the design phase will be a very small portion of the overall Remedial Design budget. If the studies indicate that treatment can render the battery casings non-hazardous, they may be eligible for disposal in a less costly land disposal facility.

Continue monitoring of groundwater via monitoring and residential wells. This program may indicate the future need for an extraction and treatment system or reevaluation of the decision to leave some contaminated soils onsite. Therefore, the site will not be deleted from the NPL so that the U.S. EPA retains the authority to take future actions at the site as warranted.

APPENDIX A

Responsiveness Summary
Arcanum Iron & Metal site
September 1986

I. OVERVIEW

During the public comment period, the U.S. EPA recommended a combined alternative to deal with five components of the site: soils, groundwater, surface water, site facilities, and battery casings. The residents were mainly concerned with when something would be done at the site and the perceived inability of the government to make the responsible party pay for the clean up. A farming couple living adjacent to the site expressed specific concerns about technical aspects of the chosen remedy. They, and a few people at the public meeting, expressed concern about health effects of being exposed to lead. No comments were received from potentially responsible parties or local officials.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

According to the Community Relations Plan, community interest in the site was expressed in the late 1970s when Ohio EPA investigated the site. Due to residents' concerns about their drinking water wells, OEPA sampled a well near the site. When the site was proposed for the NPL in 1982, there was press coverage.

At U.S. EPA and Ohio EPA's RI/FS kickoff meeting in July 1984, residents expressed concern about the length of time between inclusion on the NPL and the start of the RI/FS, enforcement against PRPs, battery casings remaining on site, and effect of soil contamination on nearby agricultural fields.

> Agency Response: EPA staff described at the meeting the Superfund process, including time frames and Agency enforcement procedures. Soils from adjacent farm property was sampled and evaluated during the RI. The battery casings were evaluated during the FS.

When the RI report was published in Fall 1985, a Darke County Commissioner brought to Ohio EPA's attention that the report didn't include the years AIM operated at the site of the current Arcanum Fire Station. Subsequent Ohio EPA and U.S. EPA investigation and sampling led to excavation and removal of lead contaminanted soil from portions of one city block, including several residential yards. The work was conducted by the AIM site owner, under a consent order issued by U.S. EPA Region 5.

The end of the RI coincided with the first slowdown experienced when Superfund expired in Fall 1985. The Region explained to local officials and the media that the AIM site would be targeted for slowdown at the end of the Feasibility Study. Since then, officials and reporters have checked periodically on the status of the law's reauthorization.

Overall, few concerns were expressed during the RI/FS. Community relations activities conducted during the RI/FS are listed in Attachment I.

COMMENTS RECEIVED DURING PUBLIC COMMENT PERIOD AND AGENCY RESPONSES

Comments made during the AIM site's public comment period are summarized briefly below. The comment period was held from July 18-August 11, 1986. Three persons offered verbal comments at the public meeting; one submitted a list of questions; one comment letter was received. All comments were from residents; neither local officials nor PRPs submitted comments.

Remedial Alternative Preferences

1. Several commenters stated that they want the site cleaned up, without specifying a preference for an alternative. One commenter asked that EPA choose a remedy that is appropriate to the level of threat, that the Agency not spend more money than is necessary.

   Agency response: EPA belives that the alternative chosen will address all areas of concern (on- and off-site soil, surface water, groundwater, on-site facilities and battery casings), and thus cleanup the site and protect public health and the environment. EPA also believes the cleanup chosen is the most cost effective available.

2. The adjacent farming family had several specific comments about portions of the remedy.

   Soil. The couple requested that no soil be removed from their property because they feel any replacement soil would not be of the same quality for farming.

   Agency response: The chosen cleanup would remove all offsite soils contaminated with lead above the background level of 30 parts per million (ppm), and replace it with clean topsoil. In order to know more precisely where the offsite contaminated areas are, additional samples will be taken during the design phase of the project. It may be that most of the offsite contaminated soils are located in an unfarmed area west of the access road that leads to to the adjacent farm. If the sampling indicates that the lead contamination extends into the adjacent farm, EPA would strongly recommend removing soil around the house, at least. The federal Centers for Disease Control have indicated that elevated lead blood levels in children may result if soils contain between 500-1000 ppm in residential settings. The Agency is cleaning to background levels to provide a conservative margin of safety, and to prevent further movement of the lead in the soil into the groundwater.

   Storm Sewer Removal and Replacement. The farmer requested that the existing storm sewer not be removed because it's used to drain the farm and because resulting soil compaction would disrupt the growing conditions of the soil.

   Agency response: The storm sewer needs to be replaced with a larger pipe to handle run-off from the site during heavy rain. EPA can accomplish this by putting a new sewer on the northern boundary of the farm, as requested in the comment.

EPA will plug the existing sewer where run-off from the site enters the pipe, leaving the rest of the existing sewer available for the farm. (EPA will attempt to clean out any residual contaminants in the pipe.) -In addition, EPA will instruct its contractors to conduct the work when it is convenient to the farm (non farming months), and to preserve the topsoil and redistribute it on the field as close to its original condition as possible.

Drinking Water. The farming couple asked that the farm's drinking water well be sampled twice a year because of proximity to the site. They also said that their well had not been sampled for at least a year and a half, although they had been told it would be sampled twice-yearly.

Agency response: EPA will include the farm's well in its semi-annual (twice-yearly) sampling, which will be used as an early warning of possible groundwater contamination migration. Monitoring wells and other residential wells will be included as well. This monitoring will continue for 30 years, as part of operation and maintanence at the site.

3. The adjacent farming family asked that Pop Rite Lane be restored to its original condition after clean up.

   Agency response: EPA will require its contractors to maintain the Lane during cleanup, and to restore the Lane to its original condition when the cleanup is completed.

Health Effects

1. A commenter asked what health risks would be involved during the cleanup, and what information is available on health risks from being exposed to the lead smelter exhaust when the site operated.

   Agency response: During the cleanup, there is a potential for lead dust getting into the air. Before the cleanup can begin, the contractors will have to submit to EPA a health and safety plan to minimize any threat to cleanup workers or to adjacent neighbors.

   EPA contacted the federal Agency for Toxic Substances and Disease Registry regarding possible health problems from the smelter. ATSDR said that the only way to know for sure whether an individual is suffering from previous exposure to the smelter is to get a blood test for lead poisoning. This test is available through the Darke County Department of Health.

Enforcement Action

1. One commenter questioned whether AIM's operations met existing rules.

   Agency response: The owner and operator of Arcanum Iron and Metal violated provisions of the Clean Water Act by dumping battery acid onsite and letting it flow to Sycamore Ditch. Ohio EPA signed a consent order with the owner to have him install a treatment system to neutralize the acid. The owner tried to install the system, but it never operated properly. Rather than fulfill the conditions of the order, the owner ceased operations at the site.

2. Several commenters asked whether the site owners are responsible for cleanup and when the Agency would negotiate with the potentially responsible parties. Several commenters expressed frustration that those responsible for the contamination are "getting away with it."

   Agency response: The Superfund law includes past and current site owners as parties liable for cleanup. Also included are site operators, generators of waste that went to the site, and transporters of waste to the site.

   The Superfund law has provisions for responsible parties to perform the necessary studies, cleanup and maintenance at a site, under EPA oversight. When a responsible party chooses not to, or cannot, undertake any of the necessary activites at a site, EPA undertakes the activities and reserves the right to recover costs at a later date. In July 1984, EPA notified potentially responsible parties that they could conduct the remedial investigation/feasibility study under EPA oversight. The parties chose not to. In July 1986, the Agency gave the parties the opportunity to conduct the cleanup proposed in the Feasibility Study. However, the Agency determined during negotiations that the parties could not conduct the cleanup adequately. Therefore, EPA will perform the work and attempt to recover costs later. The cost includes everything EPA will have spent on the investigation, the cleanup and long term maintenance. The site owner did pay for the cleanup of the Arcanum 2 site (fire station area) in early 1986.

3. One commenter specifically requested that taxpayer money not be used for the cleanup unless absolutely necessary.

   Agency response: Response #2 explains why EPA will pay for the cleanup up front. To clarify, the taxpayers have contributed directly only 13% of the Superfund. As the law now stands, the majority of the fund comes from a tax on industries using certain feed stock chemicals. (Although the taxpayer may pay indirectly through the cost of products made out of these chemicals.) Congress may change this funding structure when it reauthorizes the law.

Other Comments

1. A few commenters asked how they could contact their Congressman or otherwise influence the reauthorization of Superfund.

   Agency response: The AIM site is within the 8th Congressional District, represented by Thomas Kindness, 646 High St., Hamilton OH 45013.

2. Commenters had questions regarding past and future timing. What led to the initial investigation of the site? Why hasn't EPA taken action before now? When can cleanup begin?

   Agency response: The first examination of the site was in 1964 when fish died in Painter Creek. OEPA took action to correct operational problems in the late 1970s (see earlier response). U.S. EPA began its involvement with the site when it was listed in December 1982 on the National Priorities List of hazardous waste site eligible for investigation and cleanup. It took from July 1984 to July 1986 to investigate the site and evaluate cleanup alternatives. It typically takes one and one-half to two years to learn enough about a site to choose a cleanup that will adequately protect health and the environment.

The Agency is ready to begin the engineering designs for the cleanup. The design work is expected to take about a year; the construction phase is expected to take another one to two years. Past experience at other Superfund sites shows that this is a typical schedule. Work on the design and construction cannot begin until Superfund is reauthorized or other funds become available.

IV. REMAINING CONCERNS

At the public meeting, several people questioned whether the Arcanum 2 site could have contaminated wells or groundwater beneath the fire station, or whether contamination from the AIM site could have spread downtown. One commenter offered her well for sampling, another commenter suggested that EPA may want to use a well south of town for monitoring.

Agency response: EPA does not believe contamination from the site has spread to the downtown area. EPA will be installing monitoring wells immediately offsite to detect as soon as possible contaminants that may migrate. For this reason, a well south of town would not be suitable for an early warning well. EPA does not believe the Arcanum 2 site will have affected the city's water, as the city's water supply is not downgradient of the site. There are few private wells in town. However, Ohio EPA did sample the commenter's well for lead. The results are expected soon.

Community Relations Activities Conducted
at Arcanum Iron & Metal Site

June 1983	Community interviews conducted for Community Relations Assessment
June 1984	Community Relations Plan finalized
July 1984	* Press release issued to announce public meeting & start of RI/FS
	Public meeting held to describe the Superfund process and the RI/FS plans for the AIM site
	Information repository established at Arcanum Public Library
September 1985	Telephone calls made and letters sent to residents regarding well water results
	Update mailed announcing availability of RI report, and summarizing results. Update included "Superfund Contingency Plan Site List" fact sheet from headquarters. (The AIM site was targeted for slowdown.)
December 1985-January 1986	Fact sheet distributed, meetings held and phone contact maintained with residents, local officials and reporters regarding emergency cleanup of the Arcanum 2 site.
April 1986	Letter sent to residents confirming earlier drinking water results.
July 1986	Press release and fact sheet issued to announce availability of FS, start of public comment period, and describing the recommended alternatives.
	Public meeting held to describe RI/FS findings and to take comments.
August 1986	Public comment period concluded.

* Press releases, updates and fact sheets were distributed to local officials, media, and residents on the site mailing list. Contact was maintained with local officials throughout the RI/FS. Ohio EPA participated in the public meetings.